

## FORMATION OF HIGHLY DISLOCATION FREE COMPOUND SEMICONDUCTOR ON A LATTICE MISMATCHED SUBSTRATE

### Abstract of the Disclosure

A highly dislocation free compound semiconductor, e.g.  $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$  ( $0 < x, y < 1$ ), is formed on a lattice mismatched substrate, e.g. Si, by first depositing a polycrystalline buffer layer on the substrate. An amorphous layer is then created at the interface of the substrate and the polycrystalline buffer layer, e.g. through ion implantation. A monocrystalline template layer of the compound semiconductor is then deposited on the buffer layer, and an epilayer of the compound semiconductor is grown on the template layer. A compound semiconductor based device structure may be formed in the epilayer.